Notice of Allowability	Application No.	Applicant(s)	
	10/769,217	DEL GRANDE, NANCY K.	
	Examiner	Art Unit	
	Faye Boosalis	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to *submission on 28 July 2006*.

2. ☒ The allowed claim(s) is/are *1-25*.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
   a) ☐ All b) ☐ Some* c) ☐ None of the:
      1. ☐ Certified copies of the priority documents have been received.
      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .
      3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

   * Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
   (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
      1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
   (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date 7/28/06
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____ .
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

EXAMINER'S STATEMENT OF REASONS FOR ALLOWANCE

Comment on Submissions

1. This communication is responsive to submissions 20 June 2006.

Allowable Subject Matter

2. Claims 1-25 are allowed.

3. The following is an examiner's statement of reasons for allowance:

Regarding independent claim 1, the prior art does not disclose or fairly suggest a method for remotely sensing subsurface objects and structures, comprising: steps of selecting one or more input parameters indicative of a host site environment, naturally heated to a depth below the subsurface object, of a host at a first location; using one or more input parameters in a heat-transfer calculation, calculating at least two sensing times, either twice daily for daily cycle for objects no deeper than three feet, or twice yearly for yearly cycle for object deeper than one foot to calculate the object site temperature spread, when the spread is distinguishably more than a host-site temperature spread; each sensing step includes imaging wavelengths from a range of about 3 microns to about 5 microns and from a range of about 8 microns to about 12 microns at two locations to record a spatial sequence of dual-band IR images; calculating signal ratios and differences to form temperature, emissivity-ratio and corrected-temperature maps to determine location of subsurface objects and determine characteristics of subsurface objects (i.e. size, shape and orientation) from the temperature maps.

The examiner notes that while it is known in the art a method for remotely sensing subsurface objects and structures using diurnal solar heating to locate apparent heat flows from objects less than the diurnal solar heat-penetration depth (i.e. heat-penetration depth of 50 cm in dry soil) (see for example Prelat et al -- *US 5,445,453 A*-- col. 1, lines 46-51, col. 2, lines 6-34 and col. 3, lines 6-14*);* also known in the art, a method using a dual-band thermal infrared scanner for water assessment in river and streams (see for example Torgersen et al – "Airborne thermal remote sensing for water temperature assessment in rivers and streams" -- page 387, section 2.1, paragraph 1 and page 389, col. 1, paragraph 3, page 389, section 2.5 and page 394, col. 1, paragraph 3) and method using radar-penetration to produce three-dimensional images of underground target areas (see for example Sunlin et al – US *5,900,833 A – See Abstract),* the prior art does not suggest a method of simulating the host and object site temperatures to determine a usable sensing time and perform a sensing step at the calculated time and then again at a later time, where each sensing step includes imaging wavelengths from two specific thermal IR wavebands at two locations to locate and characterize subsurface objects.

Regarding independent claim 20, the prior art does not disclose or fairly suggest a thermal imaging method to detect subsurface objects or air gaps, comprising: using an energy budget equation to calculate a first imaging time and a second imaging time, at two different wavelength bands, to obtain temperature maps of a first and second location; combine temperature maps to obtain temperature spreads of the first and

second location to compare first and second temperature spreads and determine object or structure location beneath first and second locations.

The examiner notes that while it is known in the art a method for remotely sensing subsurface objects and structures using diurnal solar heating to locate apparent heat flows from objects less than the diurnal solar heat-penetration depth (i.e. heat-penetration depth of 50 cm in dry soil) (see for example Prelat et al -- *US 5,445,453 A*-- col. 1, lines 46-51, col. 2, lines 6-34 and col. 3, lines 6-14*);* also known in the art, a method using a dual-band thermal infrared scanner for water assessment in river and streams (see for example Torgersen et al – "Airborne thermal remote sensing for water temperature assessment in rivers and streams" -- page 387, section 2.1, paragraph 1 and page 389, col. 1, paragraph 3, page 389, section 2.5 and page 394, col. 1, paragraph 3) and method using radar-penetration to produce three-dimensional images of underground target areas (see for example Sunlin et al – US *5,900,833 A – See Abstract),* the prior art does not suggest a method of simulating the host and object site temperatures to determine a usable sensing time and perform a sensing step at the calculated time and then again at a later time, where each sensing step includes imaging wavelengths from two specific thermal IR wavebands at two locations to locate and characterize subsurface objects.

The remaining claims 2-19 and 21-25 are allowable based on their dependency.

Conclusion

4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Faye Boosalis whose telephone number is 571-272-

2447. The examiner can normally be reached on Monday thru Friday from 7:30 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on 571-272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

5. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

FB

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